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TRANSMITTAL OF APPEAL BRIEF

Docket No. 06005/35500

In re Application of: Brent H. Larson, et al.

Application No.	Filing Date	Examiner	Group Art Unit
09/408,028	September 29, 1999	Hieu C. Le	2153

Invention: DOWNLOADABLE CODE IN A DISTRIBUTED PROCESS CONTROL SYSTEM

TO THE COMMISSIONER OF PATENTS:

Transmitted herewith in triplicate is the Appeal Brief in this application, with respect to the Notice of Appeal filed: June 26, 2003 .

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Scott E. Baxendale

Dated: October 27, 2003

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(Scott E. Baxendale)

PATENT

Attorney Docket No. 06005/35500

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of:
Larson *et al.*

Application No.: 09/408,028

Group Art Unit: 2153

Filed: September 29, 1999

Examiner: Hieu C. Le

For: DOWNLOADABLE CODE IN A DISTRIBUTED PROCESS CONTROL SYSTEM

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Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

BRIEF ON APPEAL

Dear Sir:

Pursuant to the Notice of Appeal filed June 26, 2003 in connection with the above-identified patent application, the Appellants respectfully submit the following Appeal Brief in accordance with 37 C.F.R. § 1.192. Appellants hereby request a two-month extension of time to file this Appeal Brief. This Appeal Brief is therefore timely filed within the extended period of response as the expiration for taking action (weekend of October 25 & 26, 2003) were days in which the Patent Office was closed (Saturday/Sunday), and the Appeal Brief is being forwarded to the Patent Office on October 27, 2003, the next day in which the United States Patent and Trademark Office is open for business. This Appeal Brief is accompanied by a Petition for Two-Month Extension of Time and a check in the amount of $420.00 for the petition fee for a two-month extension of time.

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I. REAL PARTY IN INTEREST

The real party in interest is Fisher-Rosemont Systems, Inc., by virtue of an assignment recorded with the U. S. Patent & Trademark Office at Reel 10659, Frame 0224.

II. RELATED APPEALS AND INTERFERENCES

There are no other appeals or interferences known to Appellants, Appellants' legal representative, or Assignee which will directly affect or be directly affected by, or have a bearing on, the Board's decision, in the pending appeal.

III. STATUS OF CLAIMS

On June 26, 2003, Appellants appealed from the final rejections of claims 1-3, 5, 6, 9-13, 17-19, 23-27 and 30-33, claim 4 having been cancelled, and claims 7, 8, 14-16, 20-22, 28, 29 and 34-36 having been objected to as being dependent upon a rejected base claim, but allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

IV. STATUS OF AMENDMENTS

There are no outstanding or unentered amendments in the pending application. The Examiner entered the proposed amendments submitted by the Applicants in the Amendment After Final Rejection Pursuant to 37 C.F.R. § 1.116 filed March 31, 2003 as noted in the Advisory Action mailed on April 22, 2003.

V. SUMMARY OF THE INVENTION

Although specification citations are inserted below in accordance with C.F.R. 1.192(c), these reference numerals and citations are merely examples of where support may be found in the specification for the terms used in this section of the brief. There is no intention to in anyway suggest that the terms of the claims are limited to the examples in the specification. Although as demonstrated by the reference numerals and citations below that the claims are fully supported by the specification as required by law, it is improper under the

law to read limitations from the specification into the claims. Pointing out specification support for the claim terminology as is done here to comply with rule 1.192(c) does not in any way limit the scope of the claims to those examples from which they find support. Nor does this exercise provide a mechanism for circumventing the law precluding reading limitations into the claims from the specification. In short, the reference numerals and specification citations are not to be construed as claim limitations or in any way used to limit the scope of the claims.

The invention as defined in the claims of the present application relates to reprogramming field devices in a process control network while the field devices are enabled to perform process control functions. Referring to Fig. 1, a distributed process control system 10 includes one or more dedicated controllers 12 each connected to one or more field devices 14 and 15, and the controllers 12 are also coupled to one or more host or operator workstations 18 via a data highway 20. (Specification, page 10, lines 2-6). The field devices 14 and 15 store and execute controller applications 23 and modules 24 that may be executed in conjunction with the execution of the modules within the controller 12 to implement process control as is known. (Specification, page 10, line 30 to page 11, line 7). From time to time, it may be necessary to reprogram the devices to, for example, correct a software problem or defect, introduce new functionality for the device, improve the performance of the device, and the like. (Specification, page 5, lines 5-8). Previously known methods for reprogramming the field devices resulted in taking the process control system partially or fully out of services for significant periods of time while the devices are reprogrammed manually or by downloading software and/or firmware from a host device. (*See, e.g.*, Specification, page 5, line 1 to page 6, line 29). The methods and apparatus of the present invention facilitate reprogramming field devices while the field devices are enabled to perform process control functions, thereby causing minimal interruption of the process control functions.

In the invention as defined in independent claims 1, 11 and 17 and with reference to Fig. 2, a reprogrammable field device 40 includes a first memory 44 that may store, for example, control applications 23, control modules 24 and operating system software 50 that may be executed when the field device 40 is enabled to perform process control functions, and a second memory 46 into which newly downloaded code is stored while the field device 40 is enabled to execute code stored in the first memory 44 to perform process control.

(Specification, page 11, line 24 to page 12, line 20). The first memory 44 and second memory 46 may be implemented in separate storage devices (*See, e.g.*, Specification, page 13, line 8 to page 15, line 8), or may be separate portions of a single storage device (*See, e.g.*, Specification, page 15, lines 9-18).

The process of downloading code and reprogramming the reprogrammable field device 40 is effected using the standard communication protocol for the process control system, and may be completed while the reprogrammable field device 40 is operational. (Specification, page 15, lines 19-23 and page 16, line 30 to page 17, line 2). The host 18 downloads the code to the reprogrammable field device 40 over the data highway 20 and then over a protocol bus or link using the standard communications protocol. (Specification, page 16, lines 9-14). As the downloaded code is received at the reprogrammable field device 40, the CPU 42 of the device 40 writes the downloaded code into the second memory 46. (Specification, page 12, lines 15-17). Once the code is completely downloaded into the second memory 46, the reprogrammable field device 40 is taken out of service or is set to some other non-operational state for a relatively short period of time while the reprogrammable field device 40 is reprogrammed to execute the downloaded code. (Specification, page 12, lines 20-23). The reprogramming may be completed either by copying the downloaded code from the second memory 46 to the first memory 44 (*See, e.g.*, claims 5 and 26; Specification, page 13, line 8 to page 14, line 2), or by redirecting the CPU 42 to execute the downloaded code stored in the second memory 46 (*See, e.g.*, claims 6 and 27; Specification, page 14, lines 3-12).

The invention as defined in independent claims 23 and 31, and with reference to Fig. 2, relates to the embodiment wherein the downloaded code may be transmitted from the host 18 to the reprogrammable field device 40 in multiple packets of data. It may be necessary to transmit the downloaded code in multiple data packets due to the volume of code being downloaded, the speed of the data highway 20 and the protocol communication link, the amount of time allotted to the controller 12 in the process control schedule for transmitting date, the speed of the storage device, and other factors. (Specification, page 16, lines 14-20). Once the downloaded code is divided into data packets, the host 18 transmits the data packets to the reprogrammable field device 40. (Specification, page 16, lines 9-16). As the reprogrammable field device 40 receives the download transmissions containing the data packets from the host 18 (or controller 12), the data is reassembled in the storage device for

proper execution by the CPU 42 of the reprogrammable field device 40 once the download is complete. (Specification, page 16, lines 20-23).

VI. ISSUES

(a) Whether claims 1-3, 5, 9-13 and 17-19 are unpatentable under 35 U.S.C. §103(e) as being anticipated by Burns *et al.*, U.S. Patent No. 5,970,430.

(b) Whether claims 23-26 and 30-33 are unpatentable under 35 U.S.C. §103(e) as being anticipated by Burns *et al.*, U.S. Patent No. 5,970,430.

(c) Whether claims 6 and 27 are unpatentable under 35 U.S.C. §103(a) as being obvious over Burns *et al.*, U.S. Patent No. 5,970,430, in view of Schrier *et al.*, U.S. Patent No. 6,055,633.

VII. GROUPINGS OF CLAIMS

For purposes of this Appeal, pending claims 1-3, 5, 9-13 and 17-19 stand or fall together as a group, pending claims 23-26 and 30-33 stand or fall together as a group, and pending claims 6 and 27 stand or fall together as a group. Appellants reserve the right, however, to present arguments advancing the patentability of the various dependent claims, or other claims supported by the present specification, in further prosecution.

VIII. ARGUMENT

(a) Claims 1-3, 5 and 9-13 are not anticipated by Burns et al., U.S. Patent No. 5,970,430 under 35 U.S.C. §102(e).

In order for a claim to be anticipated under § 102, the anticipating reference must disclose at least one embodiment that incorporates all of the claimed elements. *See, e.g., C.R. Bard, Inc. v. M3 Systems*, 48 U.S.P.Q.2d 1225, 1230 (Fed. Cir. 1998) ("When the defense of lack of novelty is based on a printed publication that is asserted to describe the same invention, a finding of anticipation requires that the publication describe all of the elements of the claims, *arranged as in the patented device*") (emphasis added); *In re* Bond, 15 U.S.P.Q.2d 1566, 1567 (Fed. Cir. 1990) ("For a prior art reference to anticipate in terms of 35 U.S.C. § 102, every element of the claimed invention must be identically shown in a single

reference... *These elements must be arranged as in the claim under review...*") (emphasis added). The Burns *et al.* reference does not disclose any embodiment that includes all the limitations of the pending claims of the present application.

Regarding claim 1, the Burns *et al.* reference neither discloses nor suggests a method of reprogramming a field device as recited in the claim for at least three reasons. First, Burns *et al.* does not teach or suggest downloading process control program instructions to a field device. Claim 1 recites downloading process control programming instructions that are executed by the field device to perform process control functions in a process control network. The diagnostic test instructions of Burns *et al.* do not control the processes of the process control network, but instead are used to test the field devices in the process control network to ensure that the devices function properly when the devices are controlled by process control program instructions to perform process control functions. For example, at column 20, Burns *et al.* discloses performing a device diagnostic evaluation on the valve 109. (Burns *et al.*, col. 20, lines 13-36). During the device diagnostic evaluation, the controller 102 tests the valve 109 by causing the valve 109 to move between fully opened and fully closed positions, and evaluates the outputs of various sensors. (Burns *et al.*, col. 20, lines 13-25). Consequently, at this time, the valve 109 is not performing process control functions, but is instead being manipulated in a test cycle to determine how the valve 109 will operate when process control program instructions are executed by the controller 102 to perform process control functions. Therefore, because diagnostic test instructions are not executed to cause a device to perform process control, it follows that diagnostic test instructions are not process control programming instructions execute to perform process control functions as recited in claim 1.

Second, assuming, *arguendo*, that diagnostic test instructions may be construed to be process control program instructions, Burns *et al.* does not disclose or suggest downloading replacement instructions while the field device is executing stored instructions that are to be replaced by the downloaded instructions at all, let alone stored instructions that are being executed to perform process control functions as recited in claim 1 as amended. The portion of the Burns *et al.* specification cited by the Examiner for the downloading and storage of instructions (col. 21, lines 40-65) merely states that diagnostic procedures may be downloaded and stored at or before the time the procedure is to be run, but does not disclose or suggest that the downloaded diagnostics procedures are replacing stored diagnostic

procedures being executed by the field device. No other portion of the Burns *et al.* reference appears to disclose the downloading of any instructions to replace any instructions being executed by the field device. Consequently, Burns *et al.* does not anticipate or render obvious claim 1 for this additional reason.

Finally, Burns *et al.* does not disclose a first memory having stored process control program instructions, and a second memory receiving and storing replacement downloaded process control program instructions while the stored process control program instructions to be replaced by the downloaded process control program instructions are being executed as recited in claim 1. In the rejection of previously pending claim 4, the limitations of which were subsequently incorporated into claim 1, the Examiner cited to a passage in the Summary of the Invention section discussing a memory of a field device (col. 4, line 65 to col. 5, line 4 and col. 6, lines 14-22) as disclosing a first memory, and to a passage in the Description of the Preferred Embodiments discussing a RAM 146 of the field device 16 (col. 21, line 62-65) as disclosing a second memory. From reading the two cited portions and the remainder of the specification, it is apparent that the Summary section discloses that the field devices include a memory for storing diagnostic test routines, and the Detailed Description section discloses a specific embodiment of that memory, the RAM 146, and does not disclose first and second memories in a field device as asserted by the Examiner. Even assuming the passages cited by the Examiner recite two memories, or if separate portions of a single memory device are considered to be first and second memories, the Burns *et al.* reference still fails to disclose or suggest storing program instructions in one memory and downloading program instructions to a second memory while the stored program instructions to be replaced by the downloaded program instructions are being executed by the field device. Therefore, for this additional reason, Burns *et al.* does not anticipate or render obvious amended claim 1 and claims 2, 3 and 5-10 depending therefrom.

In light of the foregoing, it cannot be fairly said that Burns *et al.* discloses a method of reprogramming a field device having a first memory having stored process control program instructions that are executed by the field device while replacement downloaded process control program instructions are downloaded and stored in a second memory. As such field devices having first and second memories are set forth in each of the rejected claims 1-3 and 5-10, the Appellants respectfully submit that the anticipation rejection in view of Burns *et al.* set forth by the Examiner is misplaced and should be overturned. Moreover, because Burns

et al. contains no suggestion to modify the field devices cited by the Examiner to store the stored process control program instructions and replacement downloaded process control program instructions simultaneously in first and second memories, respectively, the Appellants further submit that the rejected claims are not obvious in view of Burns *et al.*

With respect to claim 3, which recites transmitting process control program instructions using a plurality of unscheduled queued communications, Appellants respectfully submit that the Examiner misreads both the claim and the Burns *et al.* reference. The claim recites transmitting the process control program instructions in multiple communications or messages, while the cited passage of the Burns *et al.* reference (col. 15, lines 58-63) merely describes three alternative virtual communication relationships or types (client/server, report distribution and publisher/subscriber) that may be used to transmit data or messages in the Fieldbus protocol. This passage, and indeed the entire Burns *et al.* reference, fails to disclose downloading any instructions from a host device to a field device using multiple communications. Therefore, the Burns *et al.* reference does not render claim 3 anticipated or obvious for this additional reason.

Similar to claim 3, independent basis exists for finding claim 5 allowable over the Burns *et al.* reference. Claim 5 recites that the downloaded process control program instructions are copied from the second memory of the field device to the first memory of the field device. The Examiner relies on the same passage of the specification relied upon in rejecting claim 3 (col. 15, lines 58-63) and a portion of the subsequent text (col. 16, lines 19-22), which describe the three types of communications that may be used to transmit messages **between** field devices over a bus, and do not relate to processing occurring solely within the field devices, such as copying instructions from one memory or portion of a memory to another memory or portion of a memory within the field device. Therefore, claim 5 is also not rendered anticipated or obvious by the Burns *et al.* reference for this additional reason.

Regarding amended independent claims 11-13 and 17-19, Appellants respectfully submit that Burns *et al.* neither discloses nor suggests a system (claims 11-13) or a reprogrammable field device (claims 17-19) for the reasons discussed above with respect to claims 1-3 and 5-10. As a result, Appellants respectfully request that the rejection of claims 11-13 and 17-19 in view of Burns *et al.* be overturned.

(b) Claims 23-26 and 30-33 are not anticipated by Burns et al., U.S. Patent No. 5,970,430 under 35 U.S.C. §102(e).

Appellants respectfully submit that Burns *et al.* neither discloses nor suggests dividing process control program instructions into a plurality of data packets, downloading the data packets from a host device to a field device, and reassembling the downloaded data packets into the process control program instructions as recited in the method and system of claims 23 and 31, respectively. Burns *et al.* contains no disclosure whatsoever that the host 12 cited by the Examiner divides process control program instructions into data packets before downloading the process control program instructions to the field devices, and the Appellants believe that the Examiner also misreads the portions of the Burns *et al.* reference cited in this rejection. In the passage cited by the Examiner at col. 21, Burns *et al.* describes downloading a test (diagnostic) definition or procedure to the field device 16. However, Burns *et al.* does not suggest that the test definition or procedure is divided into data packets before being downloaded. Consequently, not only does Burns *et al.* not disclose dividing instructions into data packets, it necessarily follows that Burns *et al.* neither discloses nor suggests reassembling data packets at the field device 12.

The communication interface 142 cited by the Examiner is disclosed as "adding framing information to data packets according to any protocol definition." While the Appellants are willing to concede that Burns *et al.* reference contains the words "data packets," "adding framing information to data packets" appears to suggest augmenting the data packets with information that was not previously associated with the data packets for the purpose of *transmitting* the data packets according to the protocol definition, and not *reassembling* data packets into process control program instructions that were previously divided into the data packets at a host device *after the data packets are received at the field device*. Because Burns *et al.* fails to disclose or suggest dividing process control program instructions into data packets at a host device, downloading the data packets to a field device, and reassembling the data packets into the process control program instructions at the field device as recited in claims 23 and 31, it follows that Burns *et al.* neither anticipates nor renders obvious claims 23-26 and 30-33.

(c) Claims 6 and 27 are not rendered obvious by Burns et al., U.S. Patent No. 5,970,430, in view of Schrier et al., U.S. Patent No. 6,055,633 under 35 U.S.C. §103(a).

The combination of the Burns *et al.* and Schrier *et al.* references proposed by the Examiner does not render claims 6 and 27 obvious because the references together do not teach all of the limitations of the claims, and do not provide the required motivation or suggestion for combining the references in the manner proposed by the Examiner. Section 2143.03 of the M.P.E.P. states: "To establish *prima facie* obviousness of a claimed invention, all the claim limitations must be taught or suggested by the prior art. *In re* Royka, 490 F.2d 981, 180 U.S.P.Q. 580 (C.C.P.A. 1974). 'All words in a claim must be considered in judging the patentability of that claim against the prior art.' *In re* Wilson, 424 F.2d 1382, 1385, 165 U.S.P.Q. 494, 496 (C.C.P.A. 1970)." With respect to the rejection of claim 6, Burns *et al.* does not disclose or suggest each of the limitations of claim 1 from which claim 6 depends[1] for the reasons discussed above, and the Schrier *et al.* reference does not provide the elements missing from the Burns *et al.* reference. As discussed above, Burns *et al.* does not disclose downloading process control program instructions while the stored process control program instructions to be replaced are executed by the field device. Schrier *et al.* also fail to disclose this limitation. Schrier *et al.* in fact discloses the opposite in a network wherein a field device stops normal data processing and halts the operation of components that are not critical to the download operation in preparation for reprogramming the field device. (Schrier *et al.*, col. 2, lines 31-40; col. 4, lines 1-10). Because neither reference teaches of suggests downloading process control program instructions while the stored process control program instructions to be replaced are executed by the field device, it follows that the Burns *et al.* and Schrier *et al.* references do not render claim 6 obvious. Similarly for claim 27, Schrier *et al.* does not teach dividing process control program instructions into data packets at the host and reassembling the data packets at the field device after they are downloaded.

Even if the Burns *et al.* and Schrier *et al.* references taught all the limitations of claims 6 and 27, there is no motivation or suggestion to combine the references in the manner proposed by the Examiner. In order to establish a *prima facie* case of obviousness, there must be actual evidence of a suggestion to modify a prior art reference, and the suggestion to modify the prior art must be clear and particular. *In re* Dembiczak, 50 U.S.P.Q.2d 1614,

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[1] Claims 5-8 as currently pending depend from claim 4 which was canceled in the March 31, 2003 Amendment After Final. Claims 5-8 should have been amended to depend from claim 1, and Appellants will due so if the rejections of the claims are overturned.

1617 (Fed. Cir. 1999). *See, e.g., In re* Dembiczak, 50 U.S.P.Q.2d 1614, 1617 (Fed. Cir. 1999), where the Court of Appeals for the Federal Circuit stated:

> We have noted that evidence of a suggestion, teaching, or motivation to combine may flow from the prior art references themselves, the knowledge of one of ordinary skill in the art, or, in some cases, from the nature of the problem to be solved . . .
>
> * * *
>
> The range of sources available, however, does not diminish the requirement for **actual evidence**. That is, the showing must be **clear and particular**. Broad conclussory statements regarding the teaching of multiple references, standing alone, are **not 'evidence.'** (emphasis added, citations omitted).

Moreover, Section 2141.02 of the M.P.E.P. states that "[a] prior art reference must be considered in its entirety, i.e., as a whole, including portions that would lead **away** from the claimed invention" (emphasis added). It is respectfully submitted that the combination of two patents, where one of the patents specifically teaches that such combination should not be made, is manifestly improper.

In the final Office action, the Examiner asserts in conclussory fashion that "[i]t would have been obvious . . . to use Schrier's teachings to modify Burns's method by redirecting the field device to switch to execute the download process control program instructions in the second memory in order to reprogram memory of a field device while communicating online." (12/30/02 final Office action at p. 15). This is the type of conclussory statement that the Federal Circuit has held is not evidence, and the Examiner does not, and cannot, point to actual evidence of a suggestion or teaching of combining a process diagnostics reference (Burns *et al.*) with a device reprogramming reference (Schrier *et al.*). Burns *et al.* teaches diagnostics in a field device, but does not suggest reprogramming the field device, while Schrier *et al.* teaches reprogramming a field device, but does not suggest performing or reprogramming diagnostics in the field device. Moreover, Schrier *et al.* specifically teaches away from reprogramming a field device that is enabled to execute stored process control program instructions. In the previously-cited passages, Schrier *et al.* teaches downloading replacement instructions to a field device after normal data processing has been stopped. Additionally, Schrier *et al.* teaches that the additional current handling capability required to download when the field device is enabled for full communication processing would result in additional cost and place the device at a competitive disadvantage and, therefore, was not

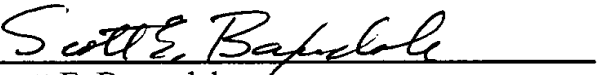
contemplated by Schrier *et al.* (col. 1, lines 36-47). Because no suggestion or motivation exists for the combination proposed by the Examiner, and Schrier *et al.* teaches away from downloading instructions while the field device is enabled to perform process control as recited in the claims, it follows that the Burns *et al.* and Schrier *et al.* references are not properly combinable to render claims 6 and 27 obvious.

IX. APPENDIX

An Appendix containing a copy of the claims involved in this Appeal, including both the rejected claims and objected to, but allowable claims is attached hereto.

Respectfully submitted,

MARSHALL, GERSTEIN & BORUN LLP

By 

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October 27, 2003

APPENDIX

Claim 1 (rejected): A method of reprogramming a field device in a process control network having a plurality of devices which are communicatively linked on a bus and which use a standard communication protocol to perform process control functions, the method comprising the steps of:

downloading process control program instructions from a host device to one of the field devices having a first memory with stored process control program instructions and a second memory using the standard communication protocol during operation of the of the process control network while the one of the field devices is enabled to execute the stored program instructions that will be replaced by the downloaded process control program instructions to perform process control;

storing the downloaded process control program instructions in the second memory while the one of the field devices is enabled to execute the stored process control program instructions that will be replaced by the downloaded process control program instructions to perform process control; and

causing the field device to discontinue executing the stored process control program instructions to perform process control and to execute the downloaded process control program instructions to perform process control.

Claim 2 (rejected): A method of reprogramming a field device in a process control network according to claim 1, wherein the downloading step comprises the step of transmitting the process control program instructions from the host device to the one of the field devices using unscheduled queued communications.

Claim 3 (rejected): A method of reprogramming a field device in a process control network according to claim 2, wherein the downloading step comprises the step of transmitting the process control program instructions from the host device to the one of the field devices using a plurality of unscheduled queued communications.

Claim 4 (canceled)

Claim 5 (rejected): A method of reprogramming a field device in a process control network according to claim 4, wherein the causing step comprises the step of copying the downloaded process control program instructions from the second memory to the first memory.

Claim 6 (rejected): A method of reprogramming a field device in a process control network according to claim 4, wherein the causing step comprises the step of redirecting the one of the field devices from executing the stored process control program instructions in the first memory to executing the downloaded process control program instructions in the second memory.

Claim 7 (objected/allowable): A method of reprogramming a field device in a process control network according to claim 4, wherein the causing step comprises the steps of:

ceasing the execution of the stored process control program instructions in the first memory;

copying the downloaded process control program instructions from the second memory to the first memory;

initiating the execution of the downloaded process control program instructions in the first memory.

Claim 8 (objected/allowable): A method of reprogramming a field device in a process control network according to claim 4, wherein the causing step comprises the steps of:

ceasing the execution of the stored process control program instructions in the first memory;

redirecting the field device to execute the downloaded process control program instructions in the second memory;

initiating the execution of the downloaded process control program instructions in the second memory.

Claim 9 (rejected): A method of reprogramming a field device in a process control network according to claim 1, wherein the standard communications protocol is the Fieldbus protocol.

Claim 10 (rejected): A method of reprogramming a field device in a process control network according to claim 1, wherein the standard communications protocol is the HART protocol.

Claim 11 (rejected): A system for reprogramming a field device in a process control network having a plurality of field devices communicatively linked over a bus, wherein each of the field devices is capable of communicating on the bus using a standard communications protocol during operation of the process control network, the system comprising:

a first device that generates downloadable process control program instructions and that transmits the downloadable process control program instructions over the bus using the standard communication protocol; and

a second device capable of receiving the downloadable process control program instructions transmitted over the bus, the second device comprising:

a processor adapted to execute a set of process control program instructions stored in the second device;

a first memory adapted to store a first set of process control program instructions that may be executed by the processor; and

a second memory adapted to store the downloadable process control program instructions transmitted over the bus;

wherein the first device transmits the downloadable process control program instructions to the second device and the second device receives the downloadable process control program instructions and stores the downloadable process control program instructions in the second memory during operation of the process control network while the

second device is enabled to execute the first set of process control program instructions that will be replaced by the downloadable process control program instructions to perform process control; and

wherein the processor discontinues executing the first set of process control program instructions to perform process control and begins executing the downloadable process control program instructions to perform process control after the downloadable process control program instructions are stored in the second memory.

Claim 12 (rejected): A system for reprogramming a field device according to claim 11, wherein the standard communication protocol includes scheduled and unscheduled communications and the first device transmits the downloadable process control program instructions to the second device using unscheduled communications.

Claim 13 (rejected): A system for reprogramming a field device according to claim 11, wherein the standard communication protocol includes concurrent analog and digital communications and the first device transmits the downloadable process control program instructions to the second device using digital communications.

Claim 14 (objected/allowable): A system for reprogramming a field device according to claim 11, wherein the first memory is a non volatile memory and the second device stores the downloadable process control program instructions in the second memory while the processor is enabled to execute process control program instructions stored in the first memory to perform process control, and wherein the second device includes a transfer unit that disables the processor from executing process control program instructions stored in the first memory after the downloadable process control program instructions are stored in the second memory, that copies the downloadable process control program instructions from the second memory to the non volatile memory of the first memory while the processor is disabled, and that reenables the processor to execute the downloadable process control program instructions stored in the first memory after the downloadable process control program instructions are copied.

Claim 15 (objected/allowable): A system for reprogramming a field devices according to claim 11, wherein the first memory is a non volatile memory adapted to store the downloadable process control program instructions, the second memory is a non volatile memory adapted to store process control program instructions that may be executed by the processor, the second device includes a transfer unit adapted to store information causing the processor to execute the process control program instructions stored in one of the first memory and the second memory, and wherein the transfer unit stores the downloadable process control program instructions in the other of the first memory and the second memory while the processor is enabled to execute process control program instructions stored in the one of the first memory and the second memory to perform process control, disables the processor from executing process control program instructions stored in the one of the first memory and the second memory after the downloadable process control program instructions are stored in the other of the first memory and the second memory, updates the stored information to cause the processor to execute the downloadable process control program instructions stored in the other of the first memory and the second memory while the processor is disabled, and reenables the processor to execute the downloadable process control program instructions stored in the other of the first memory and the second memory.

Claim 16 (objected/allowable): A system for reprogramming a field devices according to claim 11, wherein the second device further comprises a non volatile memory having a first portion containing the first memory, a second portion containing the second memory, the first memory and the second memory being adapted to store process control program instructions that may be executed by the processor and downloadable process control program instructions received in the input signal, and a transfer unit having a third memory adapted to store information causing the processor to execute the process control program instructions stored in one of the first memory and the second memory, and wherein the transfer unit stores the downloadable process control program instructions in the other of the first memory and the second memory while the processor is enabled to execute process control program instructions stored in the one of the first memory and the second memory to perform process control, disables the processor from executing process control program instructions stored in the one of the first memory and the second memory after the

downloadable process control program instructions are stored in the other of the first memory and the second memory, updates the stored information in the third memory to cause the processor to execute the downloadable process control program instructions stored in the other of the first memory and the second memory while the processor is disabled, and reenables the processor to execute the downloadable process control program instructions stored in the other of the first memory and the second memory after the third memory is updated.

Claim 17 (rejected): A reprogrammable field device capable of being used in a process control network having a plurality of devices communicatively coupled to a bus, wherein each of the devices is capable of communicating on the bus using a standard communications protocol, and wherein a host device is capable of generating input signals including downloadable process control program instructions and transmitting the input signals to the reprogrammable field device over the bus during operation of the process control network while the reprogrammable field device is enabled to perform process control, the reprogrammable field device comprising:

a processor adapted to execute a set of process control program instructions stored in the reprogrammable field device;

a first memory adapted to store a first set of process control program instructions that may be executed by the processor; and

a second memory adapted to store the downloadable process control program instructions transmitted over the bus;

wherein the reprogrammable field device receives the downloadable process control program instructions and stores the downloadable process control program instructions in the second memory during operation of the process control network while the reprogrammable device is enabled to execute the first set of process control program instructions that will be replaced by the downloadable process control program instructions to perform process control; and

wherein the processor discontinues executing the first set of process control program instructions to perform process control and begins executing the downloadable process

control program instructions to perform process control after the downloadable process control program instructions are stored in the second memory.

Claim 18 (rejected): A reprogrammable field device according to claim 17, wherein the standard communication protocol includes scheduled and unscheduled communications and the host device transmits the downloadable process control program instructions to the reprogrammable field device using unscheduled communications.

Claim 19 (rejected): A reprogrammable field device according to claim 17, wherein the standard communication protocol includes concurrent analog and digital communications and the host device transmits the downloadable process control program instructions to the reprogrammable field device using digital communications.

Claim 20 (objected/allowable): A reprogrammable field device according to claim 17, wherein the first memory is a non volatile memory and the reprogrammable field device stores the downloadable process control program instructions in the second memory while the processor is enabled to execute process control program instructions stored in the first memory to perform process control, and wherein the reprogrammable field device further comprises a transfer unit that disables the processor from executing process control program instructions stored in the first memory after the downloadable process control program instructions are stored in the second memory, copies the downloadable process control program instructions from the second memory to the non volatile memory of the first memory while the processor is disabled, and reenables the processor to execute the downloadable process control program instructions stored in the first memory after the downloadable process control program instructions are copied.

Claim 21 (objected/allowable): A reprogrammable field device according to claim 17, wherein the first memory is a non volatile memory adapted to store the downloadable process control program instructions received in the input signals, the second memory is a non volatile memory adapted to store process control program instructions that may be

executed by the processor, and the reprogrammable field device further comprises a transfer unit having a third memory adapted to store information causing the processor to execute the process control program instructions stored in one of the first memory and the second memory, and wherein the transfer unit stores the downloadable process control program instructions in the other of the first memory and the second memory while the processor is enabled to execute process control program instructions stored in the one of the first memory and the second memory to perform process control, disables the processor from executing process control program instructions stored in the one of the first memory and the second memory after the downloadable process control program instructions are stored in the other of the first memory and the second memory, updates the stored information in the third memory to cause the processor to execute the downloadable process control program instructions stored in the other of the first memory and the second memory while the processor is disabled, and reenables the processor to execute the downloadable process control program instructions stored in the other of the first memory and the second memory after the third memory is updated.

Claim 22 (objected/allowable): A reprogrammable field device according to claim 17, further comprising:

a non volatile memory having a first portion containing the first memory and a second portion containing the second memory, the first memory and the second memory being adapted to store process control program instructions that may be executed by the processor and downloadable process control program instructions received in the input signal; and

a transfer unit adapted to store information causing the processor to execute the process control program instructions stored in one of the first memory and the second memory,

wherein the transfer unit stores the downloadable process control program instructions in the other of the first memory and the second memory while the processor is enabled to execute process control program instructions stored in the one of the first memory and the second memory to perform process control, disables the processor from executing process control program instructions stored in the one of the first memory and the second memory after the downloadable process control program instructions are stored in the other of the first

memory and the second memory, updates the stored information to cause the processor to execute the downloadable process control program instructions stored in the other of the first memory and the second memory while the processor is disabled, and reenables the processor to execute the downloadable process control program instructions stored in the other of the first memory and the second memory after the third memory is updated.

Claim 23 (rejected): A method of reprogramming a field device in a process control network having a plurality of devices which are communicatively linked on a bus to perform process control functions, the method comprising the steps of:

downloading process control program instructions from a host device to one of the field devices wherein the host device divides the process control program instructions into a plurality of data packets that are downloaded to the one of the field devices over time while the one of the field devices is enabled to perform process control;

reassembling the downloaded data packets into the process control program instructions in the field device;

storing the downloaded process control program instructions in the field device; and

causing the field device to execute the downloaded process control program instructions.

Claim 24 (rejected): A method of reprogramming a field device in a process control network according to claim 23, wherein the downloading step comprises the step of transmitting the data packets from the host device to the one of the field devices using a plurality of unscheduled queued communications.

Claim 25 (rejected): A method of reprogramming a field device in a process control network according to claim 23, wherein the one of the field devices has a first memory with stored process control program instructions and a second memory, wherein said storing step comprises the step of storing the downloaded process control program instructions in the second memory while the one of the field devices is capable of executing the stored process control program instructions to perform process control.

Claim 26 (rejected): A method of reprogramming a field device in a process control network according to claim 25, wherein the causing step comprises the step of copying the downloaded process control program instructions from the second memory to the first memory.

Claim 27 (rejected): A method of reprogramming a field device in a process control network according to claim 25, wherein the causing step comprises the step of redirecting the one of the field devices from executing the stored process control program instructions in the first memory to executing the downloaded process control program instructions in the second memory.

Claim 28 (objected/allowable): A method of reprogramming a field device in a process control network according to claim 25, wherein the causing step comprises the steps of:

ceasing the execution of the stored process control program instructions in the first memory;

copying the downloaded process control program instructions from the second memory to the first memory;

initiating the execution of the downloaded process control program instructions in the first memory.

Claim 29 (objected/allowable): A method of reprogramming a field device in a process control network according to claim 25, wherein the causing step comprises the steps of:

ceasing the execution of the stored process control program instructions in the first memory;

redirecting the field device to execute the downloaded process control program instructions in the second memory;

initiating the execution of the downloaded process control program instructions in the second memory.

Claim 30 (rejected): A method of reprogramming a field device in a process control network according to claim 23, wherein the plurality of devices communicate using a standard communication protocol.

Claim 31 (rejected): A system for reprogramming a field device in a process control network having a plurality of field devices communicatively linked over a bus, wherein each of the field devices is capable of communicating on the bus during operation of the process control network, the system comprising:

a first device that divides downloadable process control program instructions into a plurality of data packets and that transmits the data packets over the bus; and

a second device capable of receiving the data packets transmitted over the bus and reassembling the data packets into the downloadable process control program instructions, the second device comprising:

a processor adapted to execute a set of process control program instructions stored in the second device;

a first memory adapted to store a first set of process control program instructions that may be executed by the processor; and

a second memory adapted to store the downloadable process control program instructions transmitted over the bus;

wherein the first device transmits the data packets to the second device and the second device receives the data packets, reassembles the data packets into the downloadable process control program instructions, and stores the process control program instructions in the second memory during operation of the process control network while the second device is enabled to perform process control.

Claim 32 (rejected): A system for reprogramming a field device according to claim 31, wherein the field devices communicate using scheduled and unscheduled

communications and the first device transmits the data packets to the second device using unscheduled communications.

Claim 33 (rejected): A system for reprogramming a field device according to claim 31, wherein the field devices communicate using concurrent analog and digital communications and the first device transmits the data packets to the second device using digital communications.

Claim 34 (objected/allowable): A system for reprogramming a field device according to claim 31, wherein the first memory is a non volatile memory and the second device stores the downloadable process control program instructions in the second memory while the processor is enabled to execute process control program instructions stored in the first memory to perform process control, and wherein the second device includes a transfer unit that disables the processor from executing process control program instructions stored in the first memory after the downloadable process control program instructions are stored in the second memory, that copies the downloadable process control program instructions from the second memory to the non volatile memory of the first memory while the processor is disabled, and that reenables the processor to execute the downloadable process control program instructions stored in the first memory after the downloadable process control program instructions are copied.

Claim 35 (objected/allowable): A system for reprogramming a field devices according to claim 31, wherein the first memory is a non volatile memory adapted to store the downloadable process control program instructions, the second memory is a non volatile memory adapted to store process control program instructions that may be executed by the processor, the second device includes a transfer unit adapted to store information causing the processor to execute the process control program instructions stored in one of the first memory and the second memory, and wherein the transfer unit stores the downloadable process control program instructions in the other of the first memory and the second memory while the processor is enabled to execute process control program instructions stored in the one of the first memory and the second memory to perform process control, disables the

processor from executing process control program instructions stored in the one of the first memory and the second memory after the downloadable process control program instructions are stored in the other of the first memory and the second memory, updates the stored information to cause the processor to execute the downloadable process control program instructions stored in the other of the first memory and the second memory while the processor is disabled, and reenables the processor to execute the downloadable process control program instructions stored in the other of the first memory and the second memory.

Claim 36 (objected/allowable): A system for reprogramming a field devices according to claim 31, wherein the second device further comprises a non volatile memory having a first portion containing the first memory, a second portion containing the second memory, the first memory and the second memory being adapted to store process control program instructions that may be executed by the processor and downloadable process control program instructions received in the input signal, and a transfer unit having a third memory adapted to store information causing the processor to execute the process control program instructions stored in one of the first memory and the second memory, and wherein the transfer unit stores the downloadable process control program instructions in the other of the first memory and the second memory while the processor is enabled to execute process control program instructions stored in the one of the first memory and the second memory to perform process control, disables the processor from executing process control program instructions stored in the one of the first memory and the second memory after the downloadable process control program instructions are stored in the other of the first memory and the second memory, updates the stored information in the third memory to cause the processor to execute the downloadable process control program instructions stored in the other of the first memory and the second memory while the processor is disabled, and reenables the processor to execute the downloadable process control program instructions stored in the other of the first memory and the second memory after the third memory is updated.